Southwest Pennsylvania
July 2011

Property Owner: (b) (6) [redacted]
Sample ID: SWPASW02

Southwest Pennsylvania Case Study Analytical Results

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Sample Date: 07/25/2011

	Analyte	Units	Result	Qualifier	MCL*	Comment
General Chemistry	pH	pH units	8.13			
	SPECIFIC CONDUCTIVITY	mS/cm	0.457			
	TOTAL DISSOLVED SOLIDS	mg/L	297			
	OXIDATION REDUCTION POTENTIAL	mV	-1			
	DISSOLVED OXYGEN	mg/L	6.06			
	TEMPERATURE	degrees Celsius	22.1			
	TURBIDITY	NTU	47			
	CHLORIDE	mg/L	60.4			
	BROMIDE	mg/L	0.48	J		
	FLUORIDE	mg/L	0.14	J	4	
	SULFATE	mg/L	43.6			
	HYDROGEN SULFIDE	mg S/L	<0.01	U		
	NITRATE + NITRITE	mg N/L	0.42		10	
	FERROUS IRON	mg Fe^{2+}/L	0.03	J		
	AMMONIA	mg N/L	<0.10	U		
	DISSOLVED ORGANIC CARBON	mg/L	1.80			
	DISSOLVED INORGANIC CARBON	mg/L	51.9			
	ALKALINITY	mg $CaCO_3$/L	292			
	ANION-CATION BALANCE	%	0.5			

Field-determined concentrations of ferrous iron and hydrogen sulfide are screening values.

The MCL for nitrate+nitrite is 10 mg/L.
(http://www.epa.gov/ogwdw/pdfs/factsheets/ioc/tech/nitrates.pdf)

Volatile Organics	1,1,1-TRICHLOROETHANE	µg/L	<0.5	U	200	
	1,1,2-TRICHLOROETHANE	µg/L	R	R	5	
	1,1-DICHLOROETHANE	µg/L	<0.5	U		
	1,1-DICHLOROETHENE	µg/L	R	R	7	
	1,2,3-TRIMETHYLBENZENE	µg/L	<0.5	U		

(R) Data rejected. 1,1,2-trichloroethane is subject to alkaline hydrolysis to 1,1-dichloroethene. This reaction could be supported by the sample preservative (trisodium phosphate).

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Volatile Organics	1,2,4-TRIMETHYLBENZENE	µg/L	<0.5	U		
	1,2-DICHLOROBENZENE	µg/L	<0.5	U	600	
	1,2-DICHLOROETHANE	µg/L	<0.5	U	5	
	1,3,5-TRIMETHYLBENZENE	µg/L	<0.5	U		
	1,3-DICHLOROBENZENE	µg/L	<0.5	U		
	1,4-DICHLOROBENZENE	µg/L	<0.5	U	75	
	ACETONE	µg/L	<1.0	U		
	ACRYLONITRILE	µg/L	<25	U		
	BENZENE	µg/L	<0.5	U	5	
	CARBON DISULFIDE	µg/L	<0.5	U		
	CARBON TETRACHLORIDE	µg/L	<0.5	U	5	
	CHLOROBENZENE	µg/L	<0.5	U	100	
	CHLOROFORM	µg/L	<0.5	U	†	
	CIS-1,2-DICHLOROETHENE	µg/L	<0.5	U	70	
	DIISOPROPYL ETHER	µg/L	<1.0	U		
	ETHANOL	µg/L	<100	U		
	ETHYL TERT-BUTYL ETHER	µg/L	<1.0	U		
	ETHYLBENZENE	µg/L	<1.0	U	700	
	ISOPROPANOL	µg/L	<25	U		
	ISOPROPYLBENZENE	µg/L	<0.5	U		
	M+P XYLENE	µg/L	<2.0	U	Total Xylenes 10000	
	O-XYLENE	µg/L	<0.5	U		
	METHYL TERT-BUTYL ETHER	µg/L	<1.0	U		
	METHYLENE CHLORIDE	µg/L	<1.0	U	5	
	NAPHTHALENE	µg/L	<0.5	U		
	STYRENE	µg/L	<0.5	U	100	
	TERT-AMYL METHYL ETHER	µg/L	<1.0	U		
	TERT-BUTYL ALCOHOL	µg/L	<5.0	U		
	TETRACHLOROETHENE	µg/L	<0.5	U	5	

†The MCL for trihalomethanes (THM), which consists of chloroform, bromodichloromethane, bromoform, dibromochloromethane, is 80 µg/L. Only chloroform was analyzed as part of this study.

The MCL for total xylenes, which includes m+p xylene and o-xylene, is 10,000 µg/L.

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	Analyte	Units	Result	Qualifier	MCL*	Comment
Volatile Organics	TOLUENE	µg/L	<0.5	U	1000	
	TRANS-1,2-DICHLOROETHENE	µg/L	<0.5	U	100	
	TRICHLOROETHENE	µg/L	<0.5	U	5	
	VINYL CHLORIDE	µg/L	<0.5	U	2	
Semivolatile Organics						
	1,2,4-TRICHLOROBENZENE	µg/L	<0.50	U	70	
	1,2-BENZPHENANTHRACENE	µg/L	<0.50	U		
	1,2-DICHLOROBENZENE	µg/L	<0.50	J-,U	600	
	1,2-DINITROBENZENE	µg/L	<0.50	U		
	1,3 -DINITROBENZENE	µg/L	<0.50	U		
	1,3-DICHLOROBENZENE	µg/L	<0.50	J-,U		
	1,3-DIMETHYLADAMANTANE	µg/L	<0.50	J-,U		
	1,4-DICHLOROBENZENE	µg/L	<0.50	U	75	
	1,4-DINITROBENZENE	µg/L	<0.50	U		
	1-METHYLNAPHTHALENE	µg/L	<0.50	U		
	2,3,4,6-TETRACHLOROPHENOL	µg/L	<0.50	U		
	2,3,5,6-TETRACHLOROPHENOL	µg/L	<0.50	U		
	2,4,5-TRICHLOROPHENOL	µg/L	<0.50	U		
	2,4,6-TRICHLOROPHENOL	µg/L	<0.50	U		
	2,4-DICHLOROPHENOL	µg/L	<0.50	J-,U		
	2,4-DIMETHYLPHENOL	µg/L	<0.50	U		
	2,4-DINITROPHENOL	µg/L	<5.0	U		
	2,4-DINITROTOLUENE	µg/L	<0.50	U		
	2,6-DINITROTOLUENE	µg/L	<0.50	U		
	2-BUTOXYETHANOL	µg/L	<0.50	J-,U		
	2-CHLORONAPHTHALENE	µg/L	<0.50	U		

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	Analyte	Units	Result	Qualifier	MCL*	Comment
Semivolatile Organics	2-CHLOROPHENOL	µg/L	<0.50	U		
	2-METHYLNAPHTHALENE	µg/L	<0.50	U		
	2-METHYLPHENOL	µg/L	<0.50	U		
	2-NITROANILINE	µg/L	<0.50	U		
	2-NITROPHENOL	µg/L	<0.50	U		
	3&4-METHYLPHENOL	µg/L	<0.50	U		
	3,3'-DICHLOROBENZIDINE	µg/L	<1.00	U		
	3-NITROANILINE	µg/L	<0.50	U		
	4,6-DINITRO-2-METHYLPHENOL	µg/L	<0.50	U		
	4-BROMOPHENYL PHENYL ETHER	µg/L	<0.50	U		
	4-CHLORO-3-METHYLPHENOL	µg/L	<0.50	U		
	4-CHLOROANILINE	µg/L	<1.00	U		
	4-CHLOROPHENYL PHENYL ETHER	µg/L	<0.50	U		
	4-NITROANILINE	µg/L	<0.50	U		
	4-NITROPHENOL	µg/L	<2.50	U		
	ACENAPHTHENE	µg/L	<0.50	U		
	ACENAPHTHYLENE	µg/L	<0.50	U		
	ADAMANTANE	µg/L	<0.50	J-,U		
	ANILINE	µg/L	<1.00	U		
	ANTHRACENE	µg/L	<0.50	U		
	AZOBENZENE	µg/L	<0.50	U		
	BENZO(A)ANTHRACENE	µg/L	<0.50	U		
	BENZO(A)PYRENE	µg/L	<0.50	U	0.2	
	BENZO(B)FLUORANTHENE	µg/L	<0.50	U		
	BENZO(G,H,I)PERYLENE	µg/L	<0.50	U		
	BENZO(K)FLUORANTHENE	µg/L	<0.50	U		
	BENZOIC ACID	µg/L	<5.00	U		
	BENZYL ALCOHOL	µg/L	<0.50	U		
	BIS-(2-CHLOROETHOXY)METHANE	µg/L	<0.50	U		

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	Analyte	Units	Result	Qualifier	MCL*	Comment
Semivolatile Organics	BIS-(2-CHLOROETHYL)ETHER	µg/L	<0.50	U		
	BIS-(2-CHLOROISOPROPYL) ETHER	µg/L	<0.50	U		
	BIS(2-ETHYLHEXYL) ADIPATE	µg/L	<1.00	U	400	
	BIS-(2-ETHYLHEXYL) PHTHALATE	µg/L	<1.00	U	6	
	BUTYL BENZYL PHTHALATE	µg/L	<0.50	U		
	CARBAZOLE	µg/L	<0.50	U		
	DIBENZ(A,H)ANTHRACENE	µg/L	<0.50	U		
	DIBENZOFURAN	µg/L	<0.50	U		
	DIETHYL PHTHALATE	µg/L	<0.50	U		
	DIMETHYL PHTHALATE	µg/L	<0.50	U		
	DI-N-BUTYL PHTHALATE	µg/L	<0.50	U		
	DI-N-OCTYL PHTHALATE	µg/L	<0.50	U		
	DIPHENYLAMINE	µg/L	<0.50	U		
	FLUORANTHENE	µg/L	<0.50	U		
	FLUORENE	µg/L	<0.50	U		
	HEXACHLOROBENZENE	µg/L	<0.50	U	1	
	HEXACHLOROBUTADIENE	µg/L	<1.00	U		
	HEXACHLOROCYCLOPENTADIENE	µg/L	<0.50	U	50	
	HEXACHLOROETHANE	µg/L	<1.00	J-,U		
	INDENO(1,2,3-CD)PYRENE	µg/L	<0.50	U		
	ISOPHORONE	µg/L	<0.50	U		
	NAPHTHALENE	µg/L	<0.50	U		
	NITROBENZENE	µg/L	<0.50	U		
	N-NITROSODIMETHYLAMINE	µg/L	<0.50	U		
	N-NITROSODI-N-PROPYLAMINE	µg/L	<0.50	U		
	PENTACHLOROPHENOL	µg/L	<1.00	U	1	
	PHENANTHRENE	µg/L	<0.50	U		
	PHENOL	µg/L	<0.50	U		

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	Analyte	Units	Result	Qualifier	MCL*	Comment
Semivolatile Organics	PYRENE	µg/L	<0.50	U		
	PYRIDINE	µg/L	<0.50	U		
	R-(+)-LIMONENE	µg/L	<0.50	J-,U		
	SQUALENE	µg/L	<1.00	U		
	TERPINIOL	µg/L	<0.50	U		
	TRI-(2-BUTOXYETHYL) PHOSPHATE	µg/L	<1.00	U		
Dissolved Gases						
	METHANE	mg/L	<0.0015	U		
	ETHANE	mg/L	<0.0029	U		
	PROPANE	mg/L	<0.0041	U		
	BUTANE	mg/L	<0.0055	U		
Glycols						
	2-BUTOXYETHANOL	µg/L	<5	U		
	DIETHYLENE GLYCOL	µg/L	<50	H,U		
	TETRAETHYLENE GLYCOL	µg/L	<25	H,U		
	TRIETHYLENE GLYCOL	µg/L	<5	H,U		

The method used for glycol analysis is under development.

Low Molecular Weight Acids	ACETATE	mg/L	R	R		
	BUTYRATE	mg/L	<0.10	U		
	FORMATE	mg/L	<0.10	U		
	ISOBUTYRATE	mg/L	<0.10	U		
	LACTATE	mg/L	<0.10	U		
	PROPIONATE	mg/L	<0.10	U		

(R) Data rejected. Acetate contamination in samples and blanks is due to the sample preservative (trisodium phosphate).

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	Analyte	Units	Result	Qualifier	MCL*	Comment
Extractable Petroleum Hydrocarbons	DIESEL RANGE ORGANICS	µg/L	28.7	J-		
	GASOLINE RANGE ORGANICS/TOTAL PETROLEUM HYDROCARBONS	µg/L	<20.0	U		
Dissolved Metals						
	DISSOLVED ALUMINUM	µg/L	<494	U		
	DISSOLVED ANTIMONY	µg/L	R	R	6	
	DISSOLVED ARSENIC	µg/L	<20	U	10	
	DISSOLVED BARIUM	µg/L	144	J	2000	
	DISSOLVED BERYLLIUM	µg/L	<10	U	4	
	DISSOLVED BORON	µg/L	<333	U		
	DISSOLVED CADMIUM	µg/L	<4	U	5	
	DISSOLVED CALCIUM	mg/L	101			
	DISSOLVED CHROMIUM	µg/L	<7	U	100	
	DISSOLVED COBALT	µg/L	<4	U		
	DISSOLVED COPPER	µg/L	<20	U	1300	
	DISSOLVED IRON	µg/L	<67	U		
	DISSOLVED LEAD	µg/L	<17	U	15	
	DISSOLVED LITHIUM	µg/L	NA			
	DISSOLVED MAGNESIUM	mg/L	10.2			
	DISSOLVED MANGANESE	µg/L	78			
	DISSOLVED MOLYBDENUM	µg/L	<17	U		
	DISSOLVED NICKEL	µg/L	<84	U		
	DISSOLVED PHOSPHORUS	mg/L	<0.06	U		
	DISSOLVED POTASSIUM	mg/L	1.55	J		
	DISSOLVED SELENIUM	µg/L	<30	U	50	
	DISSOLVED SILICON	mg/L	6.01	J		

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	Analyte	Units	Result	Qualifier	MCL*	Comment
Dissolved Metals	DISSOLVED SILVER	µg/L	<14	U		
	DISSOLVED SODIUM	mg/L	21.1	J		
	DISSOLVED STRONTIUM	µg/L	400			
	DISSOLVED SULFUR	mg/L	14.4	J		
	DISSOLVED THALLIUM	µg/L	R	R	2	
	DISSOLVED THORIUM	µg/L	NA			
	DISSOLVED TITANIUM	µg/L	<7	U		
	DISSOLVED URANIUM	µg/L	NA		30	
	DISSOLVED VANADIUM	µg/L	<10	U		
	DISSOLVED ZINC	µg/L	21	J		

(R) Data rejected. Potential spectral (mass or emission) interference.

Total Metals

TOTAL ALUMINUM	µg/L	1030	J		
TOTAL ANTIMONY	µg/L	R	R	6	
TOTAL ARSENIC	µg/L	<22	U	10	
TOTAL BARIUM	µg/L	155	J	2000	
TOTAL BERYLLIUM	µg/L	<11	U	4	
TOTAL BORON	µg/L	<370	U		
TOTAL CADMIUM	µg/L	<4	U	5	
TOTAL CALCIUM	mg/L	103	J		
TOTAL CHROMIUM	µg/L	<8	U	100	
TOTAL COBALT	µg/L	<4	U		
TOTAL COPPER	µg/L	<22	U	1300	
TOTAL IRON	µg/L	699	J		
TOTAL LEAD	µg/L	<19	U	15	
TOTAL LITHIUM	µg/L	NA			
TOTAL MAGNESIUM	mg/L	10.4	J		

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	Analyte	Units	Result	Qualifier	MCL*	Comment
Total Metals	TOTAL MANGANESE	µg/L	100	J		
	TOTAL MOLYBDENUM	µg/L	<19	U		
	TOTAL NICKEL	µg/L	<93	U		
	TOTAL PHOSPHORUS	mg/L	0.04	J		
	TOTAL POTASSIUM	mg/L	1.80	J		
	TOTAL SELENIUM	µg/L	<33	U	50	
	TOTAL SILICON	mg/L	7.77	J		
	TOTAL SILVER	µg/L	<16	U		
	TOTAL SODIUM	mg/L	21.1	J		
	TOTAL STRONTIUM	µg/L	402	J		
	TOTAL SULFUR	mg/L	13.2	J		
	TOTAL THALLIUM	µg/L	R	R	2	
	TOTAL THORIUM	µg/L	NA			
	TOTAL TITANIUM	µg/L	28	J		
	TOTAL URANIUM	µg/L	NA		30	
	TOTAL VANADIUM	µg/L	4	J		
	TOTAL ZINC	µg/L	20	J		

(R) Data rejected. Potential spectral (mass or emission) interference.

Isotopes	$\delta^{13}C$ DISSOLVED INORGANIC CARBON	‰	-12.83			
	$\delta^{13}C$ METHANE	‰	NR			
	$\delta^{2}H$ METHANE	‰	NR			
	$\delta^{18}O$ WATER	‰	-8.03			
	$\delta^{2}H$ WATER	‰	-53.72			
	$^{87}Sr/^{86}Sr$	Atom Ratio	0.711506			

Radiometric	GROSS ALPHA	pCi/L	NA		15	
	GROSS BETA	pCi/L	NA			
	RADIUM - 226	pCi/L	NA		Combined	
	RADIUM - 228	pCi/L	NA		5	

**** MCL = primary Maximum Contaminant Level***

Further information on MCLs can be obtained from
http://water.epa.gov/drink/contaminants/index.cfm or
http://water.epa.gov/action/advisories/drinking/upload/dwstandards2012.pdf

Analytes and Parameters

Field Parameters

Temp	Temperature
SPC	Specific Conductivity
TDS	Total Dissolved Solids (calculated from SPC)
DO	Dissolved Oxygen
pH	Hydrogen Ion Activity
ORP	Oxidation/Reduction Potential
Fe^{2+}	Ferrous Iron
H_2S	Hydrogen Sulfide
Alkalinity	Capacity to Neutralize Acids
Turbidity	Measurement of relative clarity of water

Anions and Ammonia

Br^-	Bromide
Cl^-	Chloride
SO_4^{2-}	Sulfate
F^-	Fluoride
$NO_3^- + NO_2^-$	Nitrate + Nitrite
NH_3	Ammonia

Carbon Group

DOC	Dissolved Organic Carbon
DIC	Dissolved Inorganic Carbon

Isotopes and Dissolved Gases

He	Helium
H_2	Hydrogen
Ar	Argon
O_2	Oxygen
CO_2	Carbon dioxide
N_2	Nitrogen
CO	Carbon monoxide
C_1	Methane
C_2	Ethane
C_2H_4	Ethene
C_3	Propane
C_3H_6	Propylene
iC_4	Isobutane
nC_4	Normal Butane
iC_5	Isopentane
nC_5	Normal Pentane
C_6+	Hexane Plus
$\delta^{13}C_1$	$[(^{13}C/^{12}C)Sample-Stan./(^{13}C/^{12}C)Stan.] * 1000$
δDC_1	$[(^{2}H/H)Sample-Stan./(^{2}H/H)Stan.] * 1000$
$\delta^{13}C_2$	$[(^{13}C/^{12}C)Sample-Stan./(^{13}C/^{12}C)Stan.] * 1000$
$\delta^{13}C$ DIC	$[(^{13}C/^{12}C)Sample-Stan./(^{13}C/^{12}C)Stan.] * 1000$
$\delta^{34}S$ (in sulfide and sulfate)	$[(^{34}S/^{32}S)Sample-Stan./(^{34}S/^{32}S)Stan.] * 1000$
$\delta^{18}O$ (in sulfate)	$[(^{18}O/^{16}O)Sample-Stan./(^{18}O/^{16}O)Stan.] * 1000$
BTU	British Thermal Unit

Metals

Ag	Silver
Al	Aluminum
As	Arsenic
B	Boron
Ba	Barium
Be	Beryllium
Ca	Calcuim
Cd	Cadmium
Co	Cobalt
Cr	Chromium
Cu	Copper
Fe	Iron
K	Potassium
Li	Lithium
Mg	Magnesium
Mn	Manganese
Mo	Molybdenum
Na	Sodium
Ni	Nickel
P	Phosphorus
Pb	Lead
S	Sulfur
Sb	Antimony
Se	Selenium
Si	Silicon
Sr	Strontium
Th	Thorium
Ti	Titanium
Tl	Thallium
U	Uranium
V	Vanadium
Zn	Zinc

Radiometric*

Ra-226	Radium-226
Ra-228	Radium-228
Gross Alpha	Gross alpha particle activity
Gross Beta	Gross beta particle activity

Strontium Isotopes

Sr	Strontium
Rb	Rubidium

Extractable Petroleum Hydrocarbons

DRO	Diesel Range Organics
GRO	Gasoline Range Organics

*These analyte groups were not analyzed in this sampling event.

Analytes and Parameters

Water Isotopes

$\delta^{2}H$	$[(^{2}H/H)Sample\text{-}Stan./(^{2}H/H)Stan.] * 1000$
$\delta^{18}O$	$[(^{18}O/^{16}O)Sample\text{-}Stan./(^{18}O/^{16}O)Stan.] * 1000$

Low Molecular Weight Acids

	CAS Number
Lactate	50-21-5
Formate	64-18-6
Acetate	64-19-7
Propionate	79-09-4
Isobutyrate	79-31-2
Butyrate	107-92-6

Dissolved Gases

	CAS Number
Methane	74-82-8
Ethane	74-84-0
Propane	74-98-6
Butane	106-97-8

Surfactants*

	CAS Number
Octylphenol ethoxylate	9002-93-1
Nonylphenol ethoxylate	26027-38-3
Ethoxylated alcohol C12	
Ethoxylated alcohol C13	
Ethoxylated alcohol C14	
Nonylphenol	25154-52-3
Octylphenol	27193-28-8

Acrylamide*

	CAS Number
Acrylamide	79-06-1

Glycols

	CAS Number
2-butoxyethanol	111-76-2
Diethylene glycol	111-46-6
Triethylene glycol	112-27-6
Tetraethylene glycol	112-60-7

Volatile Organic Compounds (VOC)

	CAS Number
ethanol	64-17-5
isopropanol	67-63-0
acrylonitrile	107-13-1
styrene	100-42-5
acetone	67-64-1
tert-butyl alcohol	75-65-0
methyl tert-butyl ether	1634-04-4
diisopropyl ether	108-20-3
ethyl tert-butyl ether	637-92-3
tert-amyl methyl ether	994-05-8
vinyl chloride	75-01-4
1,1-dichloroethene	75-35-4
carbon disulfide	75-15-0
methylene chloride	75-09-2
trans-1,2-dichloroethene	156-60-5
1,1-dichloroethane	75-34-3
cis-1,2-dichoroethene	156-59-2
chloroform	67-66-3
1,1,1-trichloroethane	71-55-6
carbon tetrachloride	56-23-5
benzene	71-43-2
1,2-dichloroethane	107-06-2
trichloroethene	79-01-6
toluene	108-88-3
1,1,2-trichloroethane	79-00-5
tetrachloroethene	127-18-4
chlorobenzene	108-90-7
ethylbenzene	100-41-4
m+p xylene	108-38-3,106-42-3
o-xylene	95-47-6
isopropylbenzene	98-82-8
1,3,5-trimethylbenzene	108-67-8
1,2,4-trimethylbenzene	95-63-6
1,3-dichlorobenzene	541-73-1
1,4-dichlorobenzene	106-46-7
1,2,3-trimethylbenzene	526-73-8
1,2-dichlorobenzene	95-50-1
naphthalene	91-20-3

*These analyte groups were not analyzed in this sampling event.

Analytes and Parameters

Semivolatile Organic Compounds (sVOC)

	CAS Number
R-(+)-limonene	5989-27-5
1,2,4-trichlorobenzene	120-82-1
1,2-dichlorobenzene	95-50-1
1,2-dinitrobenzene	528-29-0
1,3-dichlorobenzene	541-73-1
1,3-dimethyladamantane	702-79-4
1,3-dinitrobenzene	99-65-0
1,4-dichlorobenzene	106-46-7
1,4-dinitrobenzene	100-25-4
1-methylnaphthalene	90-12-0
2,3,4,6-tetrachlorophenol	58-90-2
2,3,5,6-tetrachlorophenol	935-95-5
2,4,5-trichlorophenol	95-95-4
2,4,6-trichlorophenol	88-06-2
2,4-dichlorophenol	120-83-2
2,4-dimethylphenol	105-67-9
2,4-dinitrophenol	51-28-5
2,4-dinitrotoluene	121-14-2
2,6-dinitrotoluene	606-20-2
2-butoxyethanol	111-76-2
2-chloronaphthalene	91-58-7
2-chlorophenol	95-57-8
2-methylnaphthalene	91-57-6
2-methylphenol	95-48-7
2-nitroaniline	88-74-4
2-nitrophenol	88-75-5
3&4-methylphenol	108-39-4 & 106-44-5
3,3'-dichlorobenzidine	91-94-1
3-nitroaniline	99-09-2
4,6-dinitro-2-methylphenol	534-52-1
4-bromophenyl phenyl ether	101-55-3
4-chloro-3-methylphenol	59-50-7
4-chloroaniline	106-47-8
4-chlorophenyl phenyl ether	7005-72-3
4-nitroaniline	100-01-6
4-nitrophenol	100-02-7
Acenaphthene	83-32-9
Acenaphthylene	208-96-8
Adamantane	281-23-2
Aniline	62-53-3
Anthracene	120-12-7
Azobenzene	103-33-3
Benzo(a)anthracene	56-55-3

Semivolatile Organic Compounds (sVOC)

	CAS Number
Benzo(a)pyrene	50-32-8
Benzo(b)fluoranthene	205-99-2
Benzo(g,h,i)perylene	191-24-2
Benzo(k)fluoranthene	207-08-9
Benzoic Acid	65-85-0
Benzyl alcohol	100-51-6
Bis-(2-chloroethoxy)methane	111-91-1
Bis-(2-chloroethyl)ether	111-44-4
Bis-(2-chloroisopropyl)ether	108-60-1
Bis-(2-ethylhexyl) adipate	103-23-1
Bis-(2-ethylhexyl) phthalate	117-81-7
Butyl benzyl phthalate	85-68-7
Carbazole	86-74-8
Chrysene or 1,2-benzphenanthracene	218-01-9
Dibenz(a,h)anthracene	53-70-3
Dibenzofuran	132-64-9
Diethyl phthalate	84-66-2
Dimethyl phthalate	131-11-3
Di-n-butyl phthalate	84-74-2
Di-n-octyl phthalate	117-84-0
Diphenylamine	122-39-4
Fluoranthene	206-44-0
Fluorene	86-73-7
Hexachlorobenzene	118-74-1
Hexachlorobutadiene	87-68-3
Hexachlorocyclopentadiene	77-47-4
Hexachloroethane	67-72-1
Indeno(1,2,3-cd)pyrene	193-39-5
Isophorone	78-59-1
Naphthalene	91-20-3
Nitrobenzene	98-95-3
N-nitrosodimethylamine	62-75-9
N-nitrosodi-n-propylamine	621-64-7
Pentachlorophenol	87-86-5
Phenanthrene	85-01-8
Phenol	108-95-2
Pyrene	129-00-0
Pyridine	110-86-1
Squalene	111-02-4
Terpiniol	98-55-5
tri-(2-butoxyethyl) phosphate or 2-butoxyethanol phosphate	78-51-3

Hydraulic Fracturing
Sampling and Analytical QA/QC Definitions

Sampling and Analytical QA/QC Terms	Definition
Equipment Blank	A sample of analyte-free media which has been used to rinse sampling equipment or has been filtered in the same manner as filtered samples to check effectiveness of decontamination procedures.
Field Blank	Blank prepared in the field by filling a clean container with de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken.
Field Duplicate	Independent samples which are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.
Holding Time	The period of time a sample may be stored prior to its required analysis. While exceeding the holding time does not necessarily negate the veracity of analytical results, it causes the qualifying or "flagging" of any data not meeting all of the specified acceptance criteria.
Laboratory Blank	An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.
Laboratory Control Sample (LCS)	A known matrix spiked with compound(s) representative of the target analytes. This is used to document laboratory performance.
Matrix Spike (MS)	An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Intralaboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.
Method Detection Limit (MDL)	The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. (If dilution of a sample is necessary, the MDL of all compounds is elevated by the dilution factor, regardless of their presence or absence. Dilution may be necessary to either bring high concentration target analytes into calibration range or to reduce the interference effects from a high concentration of nontarget compounds on the analyte of interest.)
Quantitation Limit (QL)	The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The QL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes, the QL analyte concentration is selected as the lowest non-zero standard in the calibration curve. (If dilution of a sample is necessary, the QL of all compounds is elevated by the dilution factor, regardless of their presence or absence. Dilution may be necessary to either bring high concentration target analytes into calibration range or to reduce the interference effects from a high concentration of nontarget compounds on the analyte of interest.)
Trip Blank	A sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

References

http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/chap1.pdf
http://www.epa.gov/superfund/programs/clp/download/ism/ism12e-h.pdf

Data Qualifiers

Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the reported quantitation limit (QL).
J	The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the QL).
J+	The result is an estimated quantity, but the result may be biased high.
J-	For both detected and non-detected results, the result is estimated but may be biased low.
B	The analyte is found in a blank sample above the QL and the concentration found in the sample is less than 10 times the concentration found in the blank.
H	The sample was prepared or analyzed beyond the specified holding time. Sample results may be biased low.
*	Relative percent difference of a field or lab duplicate is outside acceptance criteria.
R	The data are unusable. The sample results are rejected due to serious deficiencies in the ability to analyze the sample and/or meet quality control criteria. Sample results are not reported. The analyte may or may not be present in the sample.

Data Descriptors

Descriptor	Definition
NA	Not Applicable (See QAPP)
NR	Not Reported by Laboratory or Field Sampling Team
ND	Not Detected
NS	Not Sampled

Note: If the analyte concentration was less than the Quantitation Limit (<QL), then the B qualifier was not applied.

If both an analyte and an associated blank concentration are between the MDL and QL, then the sample results are reported as <QL and qualified with U.

For samples associated with high Matrix Spike recoveries, the J+ qualifier was not applied if the analyte was less than the Quantitation Limit (<QL).

For samples associated with low Matrix Spike recoveries, the J- qualifier was applied to the analyte with low recovery regardless of analyte concentration (< or > QL).

The Agency is dedicated to delivering high quality data. This is the expectation for EPA's Hydraulic Fracturing research study which is considered to be a Highly Influential Scientific Assessment (HISA).[†] To meet the level of quality and rigor required by HISAs, the data have undergone thorough data validation procedures. Through this process, data quality issues were identified and appropriately noted with data qualifiers. Metals were analyzed by two methods (ICP-OES and ICP-MS). EPA is reporting metals data that were analyzed by ICP-OES. Quality concerns were encountered with the ICP-MS results and were therefore rejected.

[†] A scientific assessment is considered to be highly influential if the EPA or OMB's Office of Information and Regulatory Affairs Administrator determine that the dissemination could have a potential impact of more than $500 million in any one year on either the public or private sector OR that the dissemination is novel, controversial, or precedent-setting, or has significant interagency interest.

Key for Sample ID Numbers

ID	Definition
SWPA	Sample site
GW	Ground water sample
SW	Surface water sample
01	Sampling location
0711	Sample month and year
d	Field Duplicate

Example Sample ID SWPAGW04-0711			
SWPA Sample Site = SW PA	**GW** Ground Water Sample	**04** Sampling Location	**-0711** Sample month and year